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CLAIMS

[Claim(s)]

[Claim 1]In electronic equipment which is connected with other electronic equipment and transmits device information based on a demand from electronic equipment of these others, a memory measure which memorizes device information corresponding to two or more functions, and said two or more functions -- with a function switching means which changes a function to an inside predetermined function. A device setting-out means to read device information corresponding to a function changed by said function switching means from said memory measure, and to set it up, Electronic equipment possessing a transmitting means which transmits device information set up by said device setting-out means if there is a demand from electronic equipment besides the above.

[Claim 2]The electronic equipment according to claim 1, wherein said device setting-out means sets up device information corresponding to a function when it has a detection means to detect connection with electronic equipment besides the above and connection is detected by this detection means.

[Claim 3]The electronic equipment according to claim 1, wherein it has a power means [one / a power means / a power supply of electronic equipment] and said device setting-out means sets up device information corresponding to a function when one [said power means / a power supply].

[Claim 4]The electronic equipment according to claim 1 when said device setting-out means is changed [a function] by said function switching means during connection with electronic equipment besides the above, once it cuts connection with other electronic equipment, wherein it sets up device information corresponding to a changed function.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the electronic equipment which connection partner electronic equipment can be made to recognize as a device corresponding to two or more of this set ability about the electronic equipment which has two or more functions.

[0002]

[Description of the Prior Art]In recent years, the electronic equipment (a printer, a camera, a scanner, etc.) which has various functions is connected to PC (personal computer). For example, if what is called a digital camera that picturizes an image and is memorized to a storage is connected to PC using USB (Universal Serial Bus), A digital camera is recognized with PC as a storage device (Mass Storage Class: device which has a memory storage function). Since this serves as the effect same for PC as the hard disk having been connected, there is an advantage which can be used from various applications. On the other hand, it functions as a monitor camera of PC, and if what is called a PC camera that has only an image pick-up part which picturizes an image is connected to PC, a PC camera will be recognized by PC as a video image input device (Video Imaging Device: device which has a video image acquisition function). This mainly inputs into PC the picture photoed with the PC camera one by one, namely, it is used in order to input an animation, and it is used with applications, such as a teleconference.

[0003]Thus, PC recognizes the electronic equipment by the electronic equipment connected as a device which has a predetermined function. This has the device information concerning [electronic equipment] the function of a self-terminal.

It realizes, when are connected to PC, and PC reads and recognizes the device information.

[0004]

[Problem(s) to be Solved by the Invention]By the way, conventional electronic equipment will transmit the device information set up beforehand based on the demand from PC, if connected to PC. By this, although the electronic equipment connected can recognize PC as a device corresponding to the device information, Since it has only the device information decided beforehand even if the electronic equipment has two or more functions, there is fault of being recognized only as a device corresponding to the device information to PC. For example, the above-mentioned digital camera has a function (it corresponds to an image input device) which outputs a through picture, in order to have a function (it corresponds to a storage device) which picturizes an image and carries out storage to a storage and to photo an image. Conventionally, since only storage device information is memorized as device information in spite of having two or more functions, such a digital camera will be recognized only as a storage device, if connected to PC.

[0005]Then, in the electronic equipment which has two or more functions, an object of this invention is to provide the electronic equipment which can make the device information corresponding to two or more of these functions recognize easily on connection partner electronic equipment.

[0006]

[Means for Solving the Problem]For the above-mentioned purpose achievement, it is connected with other electronic equipment and, as for electronic equipment by the invention according to claim 1, this invention is characterized by that electronic equipment which transmits device information based on a demand from electronic equipment of these others comprises the following.

A memory measure which memorizes device information corresponding to two or more functions. said two or more functions -- a function switching means which changes a function to an inside predetermined function.

A device setting-out means to read device information corresponding to a function changed by said function switching means from said memory measure, and to set it up.

A transmitting means which transmits device information set up by said device setting-out means if there is a demand from electronic equipment besides the above.

[0007]In the electronic equipment according to claim 1, as a desirable mode, for example like the Claim 2 description said device setting-out means, It has a detection means to detect connection with electronic equipment besides the above, and may be made to set up device information corresponding to a function when connection is detected by this detection means.

[0008]It has the power means [one / in the electronic equipment according to claim 1 / like / the power means / a power supply of electronic equipment] according to claim 3, for example, and may be made, as for said device setting-out means, to set up device information corresponding to a function when one [said power means / a power supply] as a desirable mode.

[0009]In the electronic equipment according to claim 1, as a desirable mode, for example like the Claim 4 description said device setting-out means, said -- others -- when a function is changed by said function switching means during connection with electronic equipment, once cutting connection with other electronic equipment, it may be made to set up device information corresponding to a changed function

[0010]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is described with reference to Drawings.

A. Explain by making a digital camera into an example as an embodiment of electronic equipment which has two or more functions of composition this invention of an embodiment. Drawing 1 is a block diagram showing the composition of the digital camera by the embodiment of this invention. In a figure, CCD unit 1 picturizes the object image which drove CCD which is a solid state image pickup device and in which image formation was carried out by the optical system, and outputs it as an imaging signal. The image processor 2 controls an automatic white balance, an automatic exposure, etc. while carrying out Image Processing Division, such as a gamma correction and edge enhancement, to the picture information of the primary color or the complementary color incorporated from CCD unit 1. The work memory 3 memorizes temporarily the image data to which various kinds of Image Processing Division was performed by the image processor 2. The JPEG module 4 compresses the image data memorized by the work memory 3 according to operation of the shutter key provided in the key blocks 5 which consist of various kinds of operation keys, and the photographing request from external instruments (personal computer etc.). The key blocks 5 are provided with various kinds of operation keys for directing what kind of operation is made to perform, and are especially provided with the function switch for changing REC mode and PLAY mode at least by this embodiment. REC mode is operational mode (video image acquisition function) which sends out through the image data photoed with CCD unit 1 one by one from USB port 13 (video-image input device: Video Imaging Device). PLAY mode is operational mode (stored image regenerative function) which transmits image data via USB port 13 between the external memory 6 and PC which are mentioned later (storage device: Mass Storage Class).

[0011]The external memory 6 is storages which can be detached and attached freely, such as a CompactFlash card and SmartMedia, and records the above-mentioned compressed image data. The encoder 7 changes into a video signal the through picture memorized by the work memory 3

and the taken image recorded on the external memory 6. LCD9 is driven with the driver 8 and it displays the setting-out item and setting detail at the time of the video signal changed by the encoder 7 and setting-out mode. The memory controller 10 controls input and output of the image data in the work memory 3 and the external memory 6 which were mentioned above. The core based CPU 11 consists of a CPU and a ROM in which the operation program, the device information (storage device information, video image input device information) corresponding to each function, etc. were stored, and controls operation of each part containing the memory controller 10. In particular, in this embodiment, switching control in REC mode and PLAY mode is performed according to operation of the function switch formed in the key blocks 5. In REC mode it not only controls data flow by this switching control, but. Device information is set up operate as a video image input device (Video Imaging Device), and device information is set up in PLAY mode operate as a storage device (Mass Storage Class). Thereby, if the core based CPU 11 has a demand of device information from the apparatus connected via the USB port, it will transmit to the apparatus of which the device information set [above-mentioned] up was required. RS232C port 12 is a low speed transmission speed comparatively I/O Port for input and output of data. USB port 13 is an I/O Port for input and output of data with high-speed transmission speed, A REC through picture is transmitted to a host (personal computer), or (when recognized as a video image input device), a graphics file is transmitted between a host and the external memory 6 (when recognized as a storage device).

[0012]Next, drawing 2 is a circuit diagram showing the detailed composition of USB port 13 mentioned above. In a figure, the VBUSCNT terminal by the side of the core based CPU 1 is an input port which detects whether the USB cable was connected to USB connector 15. Since the VCC terminal of USB connector 15 will be set to 5V if a USB cable is connected, the existence of a cable can be known by investigating the state of a VBUSCNT terminal (input port). After a cable is connected and preparation of the application for USB connection finishes, connection is notified to the host side by controlling an output terminal USBCNT terminal (output port), and carrying out pull-up of the D+ line by the resistance R3.

[0013]Next, drawing 3 is a key map for explaining the procedure (Bus enumeration) (the device recognition method) after the USB device was connected to a host's PC. The digital camera which is a device stands by considering the own address as "0" first. A host will acquire a dummy device descriptor, if connection of a device (in this case, digital camera) new as a USB device is notified (S1) (S2). Next, an address is shaken at the digital camera which is a device (Set Address) (S3), and the digital camera which is a device is constituted as a device of the specified address. Next, a host publishes a descriptor acquisition command (Get Descriptor) to the device which determined the address, and acquires various device information (S4). In a descriptor, a device descriptor (a device class code, product ID, etc.), There is information on configuration descriptors (the number of interfaces, power supply setting out, etc.), an interface descriptor (the number of end points and an interface class), and a pointer descriptor (bulk and isochronous transfer type specification). Finally, if recognition of the device class of the digital camera which is a device is completed, a host, The device driver by the side of the host who published the composition set command (Set Configuration) (S5), and suited the connected USB device is loaded, work is ended, and operation by USB is started (S6).

[0014]Next, drawing 4 is a key map for explaining the device configuration at the time of making it operate as a storage device. Mass Storage Class is a class which realizes a file system via USB, and can deal with the digital camera which is a device as a storage like a hard disk or a floppy (registered trademark) disk. Control transmission (End Point (0)) sends the SCSI command over a device. A bulk transfer (End Point (1), (2)) is used for transmission and reception of the data of a file, and transmits a lot of data in which delay does not become a problem. The interrupt transfer of End Point (3) is written in (Write), and is used for the check of the media after command execution.

[0015]Next, drawing 5 is a key map for explaining the device configuration at the time of making it operate as a video image input device. At Video Imaging Class, it is End Point. Isochronous transfer is performed in (4). This is used for transmission of continuous and periodic data, and is used for transmitting the data of a REC through picture one by one.

[0016]B. Explain operation of an embodiment, next the operation of an embodiment mentioned above. Drawing 6 is a flow chart for explaining the operation at the time of connecting a USB cable after power supply starting or before starting. When a power supply is made one (Step S10) and a USB cable is connected after that (Step S12), or where a USB cable is connected, also in any at the time of making (Step S14) and a power supply one (Step S16), it shifts to USB mode. By investigating the state of a VBUSCNT terminal shows whether the USB cable was connected.

[0017]Next, it is judged whether the function switch of the key blocks 5 is in PLAY mode, or it is in REC mode (Step S18). And when a function switch is in PLAY mode, a device configuration (setting out of device information) is performed that it should operate by making a digital camera into a storage device (Mass Storage Class) (Step S20). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. Operation of a digital camera is attained as a storage device (Mass Storage Class) after the end of ENAMYU ration.

[0018]On the other hand, when a function switch is in REC mode, a device configuration (setting out of device information) is performed that it should operate by using a digital camera as a video image input device (Video Imaging Class) (Step S22). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. Then, it enables a digital camera to transmit the picture picturized with CCD unit 1 to a host via USB port 13 one by one.

[0019]Next, drawing 7 is a flow chart for explaining the operation at the time of changing a function switch, while connecting USB. If the change of a function switch is detected during USB connection (Step S30), USB end processing which is needed as application software will be performed (Step S32). Next, once once canceling the pull-up of D+ line and separating USB connector 15 from a bus by controlling a USBCNT signal, it changes into the state where the USB cable was newly reconnected, by carrying out pull-up of the D+ line again (Step S34).

[0020]Next, it is judged whether the function switch of the key blocks 5 is in PLAY mode, or it is in REC mode (Step S36). And when a funk place switch is in PLAY mode, a device configuration (setting out of device information) is performed that it should operate by making a digital camera into a storage device (Mass Storage Class) (Step S38). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. The digital camera can operate as a storage device (Mass Storage Class) after the end of ENAMYU ration.

[0021]On the other hand, when a function switch is in REC mode, a device configuration (setting out of device information) is performed that it should operate by using a digital camera as a video image input device (Video Imaging Class) (Step S40). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. Then, it enables a digital camera to transmit the picture picturized with CCD unit 1 to a host via USB port 13 one by one.

[0022]According to this embodiment, USB functional development by the side of a USB device can also be separately performed for every function, without being able to use a general-purpose thing as a device driver on a host, and using a further mass memory.

[0023]Although the above-mentioned embodiment explained the digital camera which applied USB as a connecting means, wireless connection may be sufficient as a connecting means, for example, without being limited to this. If it is electronic equipment which is connected to other electronic equipment and has two or more device functions, not only a digital camera but of course, what kind of electronic equipment may be used.

[0024]

[Effect of the Invention]two or more functions which are memorized by the memory measure by the function switching means according to the invention according to claim 1 -- a function being changed to a predetermined function among them, and by a device setting-out means. When the device information corresponding to the changed function is read from said memory measure, and is set up and there is a demand from other electronic equipment, by a transmitting means. Since the device information set up by said device setting-out means was transmitted to other electronic equipment, in the electronic equipment which has two or more functions, the

advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

[0025]According to the invention according to claim 2, said device setting-out means, Since the device information corresponding to a function when connection with electronic equipment besides the above is detected was set up by the detection means, In the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

[0026]According to the invention according to claim 3, said device setting-out means, Since the device information corresponding to a function when one [a power means / a power supply] was set up, in the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

[0027]According to the invention according to claim 4, said device setting-out means, said -- others, since the device information corresponding to the changed function was set up once cutting connection with other electronic equipment when a function was changed by said function switching means during connection with electronic equipment, In the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

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TECHNICAL FIELD

[Field of the Invention]This invention relates to the electronic equipment which connection partner electronic equipment can be made to recognize as a device corresponding to two or more of this set ability about the electronic equipment which has two or more functions.

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PRIOR ART

[Description of the Prior Art]In recent years, the electronic equipment (a printer, a camera, a scanner, etc.) which has various functions is connected to PC (personal computer). For example, if what is called a digital camera that picturizes an image and is memorized to a storage is connected to PC using USB (Universal Serial Bus), A digital camera is recognized with PC as a storage device (Mass Storage Class: device which has a memory storage function). Since this serves as the effect same for PC as the hard disk having been connected, there is an advantage which can be used from various applications. On the other hand, it functions as a monitor camera of PC, and if what is called a PC camera that has only an image pick-up part which picturizes an image is connected to PC, a PC camera will be recognized by PC as a video image input device (Video Imaging Device: device which has a video image acquisition function). This mainly inputs into PC the picture photoed with the PC camera one by one, namely, it is used in order to input an animation, and it is used with applications, such as a teleconference.

[0003]Thus, PC recognizes the electronic equipment by the electronic equipment connected as a device which has a predetermined function. This has the device information concerning [electronic equipment] the function of a self-terminal.
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EFFECT OF THE INVENTION

[Effect of the Invention]two or more functions which are memorized by the memory measure by the function switching means according to the invention according to claim 1 -- a function being changed to a predetermined function among them, and by a device setting-out means. When the device information corresponding to the changed function is read from said memory measure, and is set up and there is a demand from other electronic equipment, by a transmitting means. Since the device information set up by said device setting-out means was transmitted to other electronic equipment, in the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

[0025]According to the invention according to claim 2, said device setting-out means, Since the device information corresponding to a function when connection with electronic equipment besides the above is detected was set up by the detection means, In the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

[0026]According to the invention according to claim 3, said device setting-out means, Since the device information corresponding to a function when one [a power means / a power supply] was set up, in the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

[0027]According to the invention according to claim 4, said device setting-out means, said -- others, since the device information corresponding to the changed function was set up once cutting connection with other electronic equipment when a function was changed by said function switching means during connection with electronic equipment, In the electronic equipment which has two or more functions, the advantage of the ability to make connection partner electronic equipment recognizing easily the device information corresponding to two or more of these functions is acquired.

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention]By the way, conventional electronic equipment will transmit the device information set up beforehand based on the demand from PC, if connected to PC. By this, although the electronic equipment connected can recognize PC as a device corresponding to the device information, Since it has only the device information decided beforehand even if the electronic equipment has two or more functions, there is fault of being recognized only as a device corresponding to the device information to PC. For example, the above-mentioned digital camera has a function (it corresponds to an image input device) which outputs a through picture, in order to have a function (it corresponds to a storage device) which picturizes an image and carries out storage to a storage and to photo an image. Conventionally, since only storage device information is memorized as device information in spite of having two or more functions, such a digital camera will be recognized only as a storage device, if connected to PC.

[0005]Then, in the electronic equipment which has two or more functions, an object of this invention is to provide the electronic equipment which can make the device information corresponding to two or more of these functions recognize easily on connection partner electronic equipment.

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MEANS

[Means for Solving the Problem]For the above-mentioned purpose achievement, it is connected with other electronic equipment and, as for electronic equipment by the invention according to claim 1, this invention is characterized by that electronic equipment which transmits device information based on a demand from electronic equipment of these others comprises the following.

A memory measure which memorizes device information corresponding to two or more functions. said two or more functions -- a function switching means which changes a function to an inside predetermined function.

A device setting-out means to read device information corresponding to a function changed by said function switching means from said memory measure, and to set it up.

A transmitting means which transmits device information set up by said device setting-out means if there is a demand from electronic equipment besides the above.

[0007]In the electronic equipment according to claim 1, as a desirable mode, for example like the Claim 2 description said device setting-out means, It has a detection means to detect connection with electronic equipment besides the above, and may be made to set up device information corresponding to a function when connection is detected by this detection means.

[0008]It has the power means [one / in the electronic equipment according to claim 1 / like / the power means / a power supply of electronic equipment] according to claim 3, for example, and may be made, as for said device setting-out means, to set up device information corresponding to a function when one [said power means / a power supply] as a desirable mode.

[0009]In the electronic equipment according to claim 1, as a desirable mode, for example like the Claim 4 description said device setting-out means, said -- others -- when a function is changed by said function switching means during connection with electronic equipment, once cutting connection with other electronic equipment, it may be made to set up device information corresponding to a changed function

[0010]

[Embodiment of the Invention]Hereafter, an embodiment of the invention is described with reference to Drawings.

A. Explain by making a digital camera into an example as an embodiment of electronic equipment which has two or more functions of composition this invention of an embodiment. Drawing 1 is a block diagram showing the composition of the digital camera by the embodiment of this invention. In a figure, CCD unit 1 picturizes the object image which drove CCD which is a solid state image pickup device and in which image formation was carried out by the optical system, and outputs it as an imaging signal. The image processor 2 controls an automatic white balance, an automatic exposure, etc. while carrying out Image Processing Division, such as a gamma correction and edge enhancement, to the picture information of the primary color or the complementary color incorporated from CCD unit 1. The work memory 3 memorizes temporarily the image data to which various kinds of Image Processing Division was performed by the image processor 2. The JPEG module 4 compresses the image data memorized by the work memory 3 according to

operation of the shutter key provided in the key blocks 5 which consist of various kinds of operation keys, and the photographing request from external instruments (personal computer etc.). The key blocks 5 are provided with various kinds of operation keys for directing what kind of operation is made to perform, and are especially provided with the function switch for changing REC mode and PLAY mode at least by this embodiment. REC mode is operational mode (video image acquisition function) which sends out through the image data photoed with CCD unit 1 one by one from USB port 13 (video-image input device: Video Imaging Device). PLAY mode is operational mode (stored image regenerative function) which transmits image data via USB port 13 between the external memory 6 and PC which are mentioned later (storage device: Mass Storage Class).

[0011]The external memory 6 is storages which can be detached and attached freely, such as a CompactFlash card and SmartMedia, and records the above-mentioned compressed image data. The encoder 7 changes into a video signal the through picture memorized by the work memory 3 and the taken image recorded on the external memory 6. LCD9 is driven with the driver 8 and it displays the setting-out item and setting detail at the time of the video signal changed by the encoder 7 and setting-out mode. The memory controller 10 controls input and output of the image data in the work memory 3 and the external memory 6 which were mentioned above. The core based CPU 11 consists of a CPU and a ROM in which the operation program, the device information (storage device information, video image input device information) corresponding to each function, etc. were stored, and controls operation of each part containing the memory controller 10. In particular, in this embodiment, switching control in REC mode and PLAY mode is performed according to operation of the function switch formed in the key blocks 5. In REC mode it not only controls data flow by this switching control, but. Device information is set up operate as a video image input device (Video Imaging Device), and device information is set up in PLAY mode operate as a storage device (Mass Storage Class). Thereby, if the core based CPU 11 has a demand of device information from the apparatus connected via the USB port, it will transmit to the apparatus of which the device information set [above-mentioned] up was required. RS232C port 12 is a low speed transmission speed comparatively I/O Port for input and output of data. USB port 13 is an I/O Port for input and output of data with high-speed transmission speed, A REC through picture is transmitted to a host (personal computer), or (when recognized as a video image input device), a graphics file is transmitted between a host and the external memory 6 (when recognized as a storage device).

[0012]Next, drawing 2 is a circuit diagram showing the detailed composition of USB port 13 mentioned above. In a figure, the VBUSCNT terminal by the side of the core based CPU 1 is an input port which detects whether the USB cable was connected to USB connector 15. Since the VCC terminal of USB connector 15 will be set to 5V if a USB cable is connected, the existence of a cable can be known by investigating the state of a VBUSCNT terminal (input port). After a cable is connected and preparation of the application for USB connection finishes, connection is notified to the host side by controlling an output terminal USBCNT terminal (output port), and carrying out pull-up of the D+ line by the resistance R3.

[0013]Next, drawing 3 is a key map for explaining the procedure (Bus enumeration) (the device recognition method) after the USB device was connected to a host's PC. The digital camera which is a device stands by considering the own address as "0" first. A host will acquire a dummy device descriptor, if connection of a device (in this case, digital camera) new as a USB device is notified (S1) (S2). Next, an address is shaken at the digital camera which is a device (Set Address) (S3), and the digital camera which is a device is constituted as a device of the specified address. Next, a host publishes a descriptor acquisition command (Get Descriptor) to the device which determined the address, and acquires various device information (S4). In a descriptor, a device descriptor (a device class code, product ID, etc.), There is information on configuration descriptors (the number of interfaces, power supply setting out, etc.), an interface descriptor (the number of end points and an interface class), and a pointer descriptor (bulk and isochronous transfer type specification). Finally, if recognition of the device class of the digital camera which is a device is completed, a host, The device driver by the side of the host who published the composition set command (Set Configuration) (S5), and suited the connected USB

device is loaded, work is ended, and operation by USB is started (S6).

[0014]Next, drawing 4 is a key map for explaining the device configuration at the time of making it operate as a storage device. Mass Storage Class is a class which realizes a file system via USB, and can deal with the digital camera which is a device as a storage like a hard disk or a floppy (registered trademark) disk. Control transmission (End Point (0)) sends the SCSI command over a device. A bulk transfer (End Point (1), (2)) is used for transmission and reception of the data of a file, and transmits a lot of data in which delay does not become a problem. The interrupt transfer of End Point (3) is written in (Write), and is used for the check of the media after command execution.

[0015]Next, drawing 5 is a key map for explaining the device configuration at the time of making it operate as a video image input device. At Video Imaging Class, it is End Point. Isochronous transfer is performed in (4). This is used for transmission of continuous and periodic data, and is used for transmitting the data of a REC through picture one by one.

[0016]B. Explain operation of an embodiment, next the operation of an embodiment mentioned above. Drawing 6 is a flow chart for explaining the operation at the time of connecting a USB cable after power supply starting or before starting. When a power supply is made one (Step S10) and a USB cable is connected after that (Step S12), or where a USB cable is connected, also in any at the time of making (Step S14) and a power supply one (Step S16), it shifts to USB mode. By investigating the state of a VBUSCNT terminal shows whether the USB cable was connected.

[0017]Next, it is judged whether the function switch of the key blocks 5 is in PLAY mode, or it is in REC mode (Step S18). And when a function switch is in PLAY mode, a device configuration (setting out of device information) is performed that it should operate by making a digital camera into a storage device (Mass Storage Class) (Step S20). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. Operation of a digital camera is attained as a storage device (Mass Storage Class) after the end of ENAMYU ration.

[0018]On the other hand, when a function switch is in REC mode, a device configuration (setting out of device information) is performed that it should operate by using a digital camera as a video image input device (Video Imaging Class) (Step S22). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. Then, it enables a digital camera to transmit the picture picturized with CCD unit 1 to a host via USB port 13 one by one.

[0019]Next, drawing 7 is a flow chart for explaining the operation at the time of changing a function switch, while connecting USB. If the change of a function switch is detected during USB connection (Step S30), USB end processing which is needed as application software will be performed (Step S32). Next, once once canceling the pull-up of D+ line and separating USB connector 15 from a bus by controlling a USBCNT signal, it changes into the state where the USB cable was newly reconnected, by carrying out pull-up of the D+ line again (Step S34).

[0020]Next, it is judged whether the function switch of the key blocks 5 is in PLAY mode, or it is in REC mode (Step S36). And when a funk place switch is in PLAY mode, a device configuration (setting out of device information) is performed that it should operate by making a digital camera into a storage device (Mass Storage Class) (Step S38). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. The digital camera can operate as a storage device (Mass Storage Class) after the end of ENAMYU ration.

[0021]On the other hand, when a function switch is in REC mode, a device configuration (setting out of device information) is performed that it should operate by using a digital camera as a video image input device (Video Imaging Class) (Step S40). In a host, the device driver corresponding to the above-mentioned device configuration is loaded by acquiring a descriptor. Then, it enables a digital camera to transmit the picture picturized with CCD unit 1 to a host via USB port 13 one by one.

[0022]According to this embodiment, USB functional development by the side of a USB device can also be separately performed for every function, without being able to use a general-purpose thing as a device driver on a host, and using a further mass memory.

[0023]Although the above-mentioned embodiment explained the digital camera which applied USB as a connecting means, wireless connection may be sufficient as a connecting means, for example, without being limited to this. If it is electronic equipment which is connected to other electronic equipment and has two or more device functions, not only a digital camera but of course, what kind of electronic equipment may be used.

[Translation done.]

* NOTICES *

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- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.**** shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1]It is a block diagram showing the composition of the digital camera by the embodiment of this invention.

[Drawing 2]It is a circuit diagram showing the detailed composition of USB port 13 mentioned above.

[Drawing 3]It is a key map for explaining the procedure after the USB device was connected to the host.

[Drawing 4]It is a key map for explaining the device configuration by Mass Storage Class.

[Drawing 5]It is a key map for explaining the device configuration by Video Imaging Class.

[Drawing 6]It is a flow chart for explaining the operation at the time of connecting a USB cable after power supply starting or before starting.

[Drawing 7]While connecting USB, it is a flow chart for explaining the operation at the time of changing a function switch.

[Description of Notations]

- 1 CCD unit
- 2 Image processor
- 3 Work memory
- 4 JPEG module
- 5 Key blocks (a function switching means, power means)
- 6 External memory
- 7 Encoder
- 8 Driver
- 9 LCD
- 10 Memory controller
- 11 Core based CPU (a memory measure, a device setting-out means)
- 12 RS232C port
- 13 USB port (a transmitting means, detection means)

[Translation done.]

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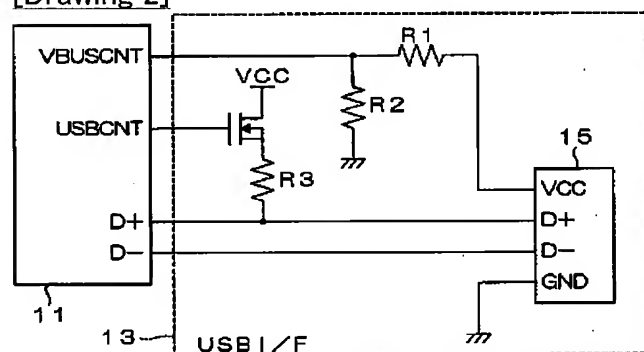
1.This document has been translated by computer. So the translation may not reflect the original precisely.

2.**** shows the word which can not be translated.

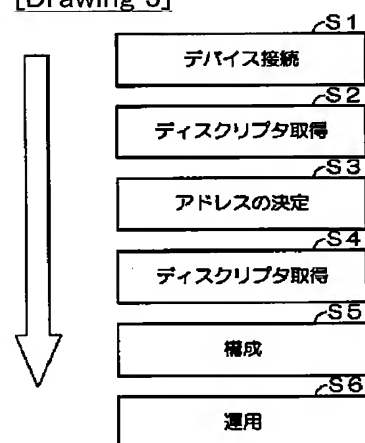
3.In the drawings, any words are not translated.

DRAWINGS

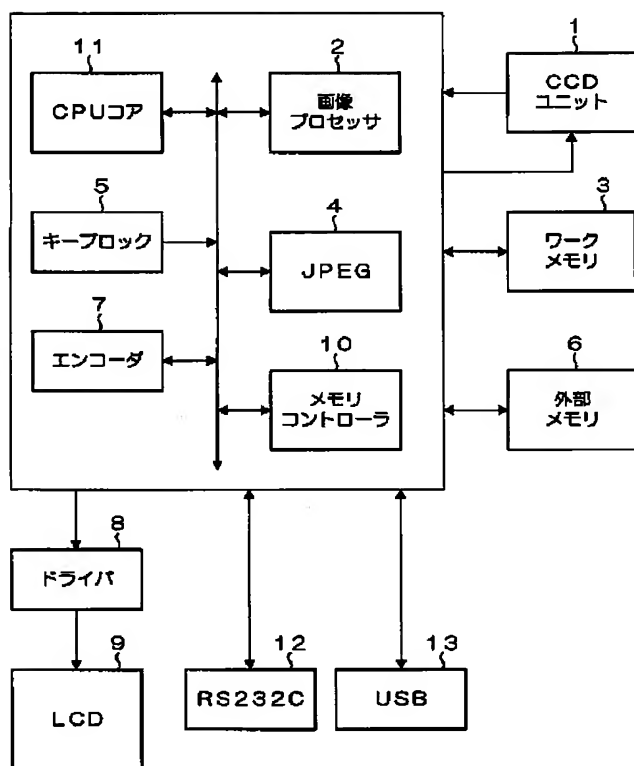
[Drawing 2]



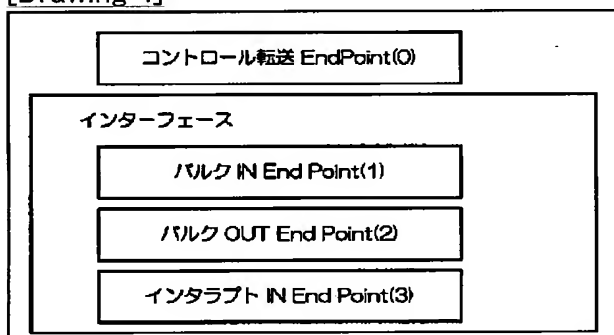
[Drawing 3]



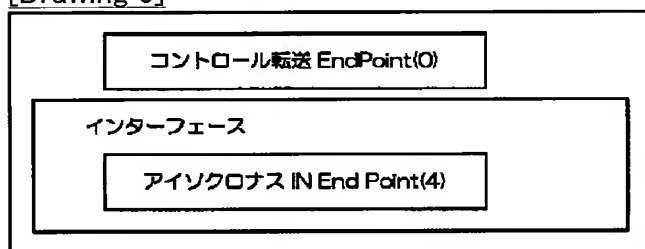
[Drawing 1]



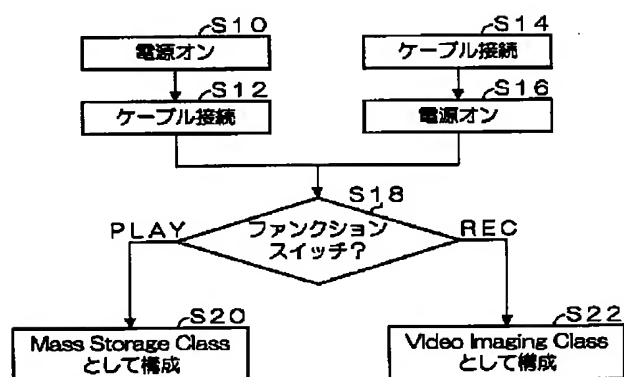
[Drawing 4]



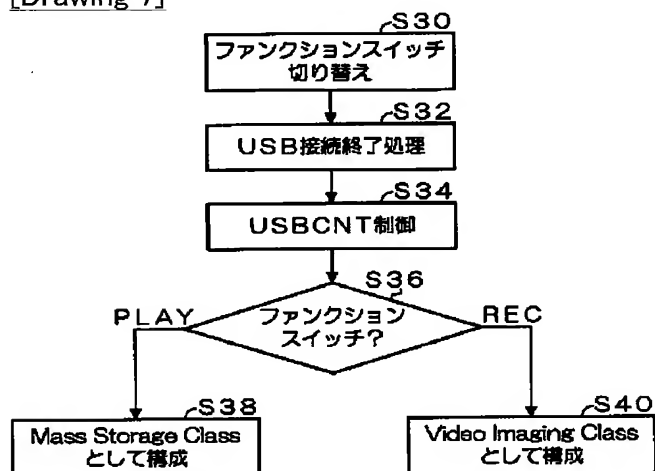
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]